كلية الصيدلة جامعه طيبه

College of Pharmacy
Taibah University

Pharmaceutics II (PPT 242)

Practical Handout for Students

Student Name: .....

Student ID number: .....

Group / Section: .....

Department of Pharmaceutics and Pharmaceutical Technology
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Practical Handout for Students

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Instruction to the students

This Practical handout contains 5 marks based on:

1. Procedure steps (2 marks)
2. Clothes/Lab coat (1 mark)
3. Label (1/2 mark)
4. Viva (1 Question) (1/2 mark)
5. Cleaning the working area (1 mark)

While in the Lab

- Wear a clean & tidy Lab coat.
- Handle all the glass-wares with care and avoid breaking them.
- Any glassware broken should be carefully brushed & sweep immediately.
- Never mishandle & play with the instruments.
- Accurately weigh & measure the chemicals to avoid scarcity.
- Don't perform any individual experiments except the one assigned to you.
- Take & use only the glassware or tools needed for the experiment only.
- Every student will be allotted a working space number at the beginning of the semester.
- Whenever in the lab student should work in the allotted space only.
- If any broken glassware, spillage of chemicals or untidiness is observed, strict action or marks will be deducted from the student responsible for that space.
- Before leaving the Lab, make sure to wash and dry the tools you used.
- Every student should use gloves and face mask while dealing with hazardous or corrosive chemicals.
- Any doubtful health symptoms observed should be reported immediately.
- Maintain silence in the lab & be like a professional.

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Faculty of Pharmacy
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Practical Course

Prescriptions and Medication Orders

- The interpretation of prescriptions and medication orders is one of the essential requirements of professional pharmacy practice.
- A prescription is defined as "an order for medication from a doctor, dentist, veterinarian or any other licensed health care professional authorized to prescribe".
- A prescription shows the relationship between the prescriber, patient, and the pharmacist, in which the latter provides the medication to the patient.
- Medication orders are prescription equivalents which are written by practitioners (prescribers) in a hospital or a similar institution.

Components of Prescriptions

- Generally, a prescription consists of the following parts (see the sample prescription in figure 1):

1. Prescriber's name, degree, address and telephone number.
   - In case of prescriptions coming from a hospital or a multi-center clinic, the hospital or clinic's name, address, and telephone numbers appear at the top.
   - In such a case, the physician's name and degree would appear near his/her signature.

2. Patient's name, address, age and the date of prescription.

3. The *Superscription*, which is represented by the Latin sign. **Rx**
   - This sign represents "take thou" or "you take" or "recipe". Sometimes, this sign is also used to denote the pharmacy itself.

4. The *Inscription* is the general content of the prescription.
   - It states the name and strength of the medication, either as its brand (proprietary) or generic (nonproprietary) name.
   - In the case of compounded prescriptions, the inscription states the name and strength of active ingredients.

5. The *Subscription* represents the directions to the dispenser and indicates the type of dosage form or the number of dosage units.
   - For compounded prescriptions, the subscription is written using English or Latin abbreviations. A few examples are provided as follows:
     - M. et ft. sol. Disp ℥ vi (Mix and make a solution. Dispense six fluid ounces)
     - Ft. ung. Dispense ℥ ii (Make ointment and dispense two ounces)
     - Ft. cap. DTD xii (Make capsules and let twelve such doses be given)

6. The *Signa*, also known as *transcription* represents the directions to the patient.
   - These directions are written in English or Latin or a combination of both. Latin directions in prescriptions are declining, but since they are still used, it is important to learn them. A few examples are given below:
     - ii caps bid, 7 days (Take two capsules twice daily for seven days).
     - gtt. iii a.u. hs (Instill three drops in both the ears at bedtime).
     - In rect. prn pain (Insert rectally as needed for pain)

7. The prescriber's signature.

8. The refill directions, in which the information about how many times a prescription can be refilled is provided.

9. Other information such as "Dispense as Written."

10. Drug Enforcement Administration (DEA) registration number and/or the state registration number of the prescribing authority.

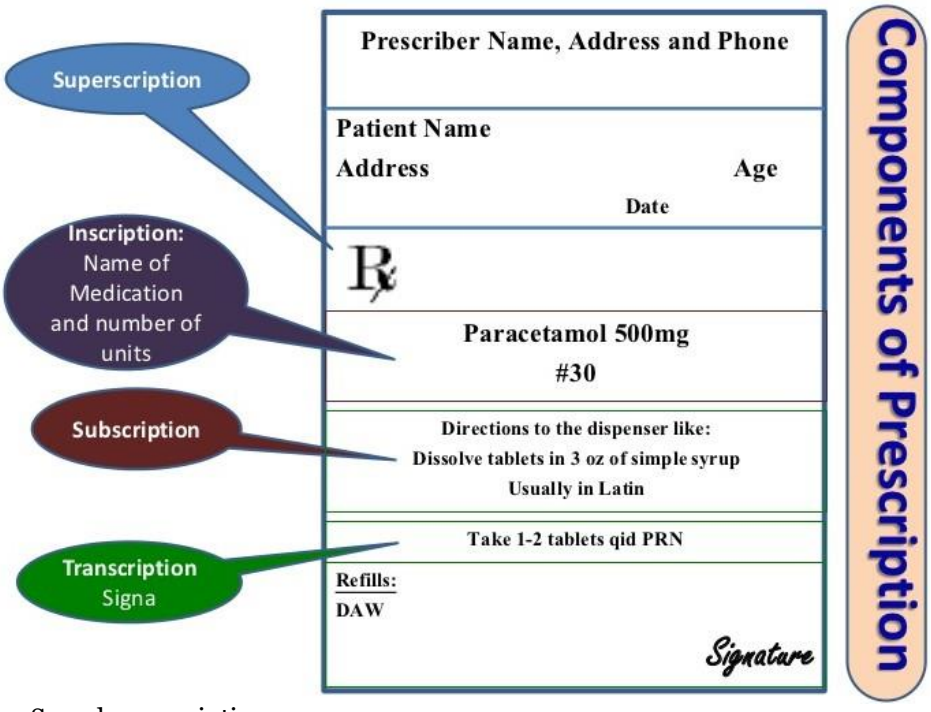

Figure 1. Sample prescription

Label on the Container

- It is a legal requirement to affix a prescription label on the immediate container of prescription medications.
- The pharmacist is responsible for the accuracy of the label.
- It should bear:
  - the name, address, and the telephone number of the pharmacy,
  - the date of dispensing,
  - the prescription number,
  - the prescriber's name,
  - the name and address of the patient, and
  - the directions for the use of the medication.
- The name and strength of the medication and the refill directions are also written frequently. The label for a sample prescription is in Figure 2.

NORTHEAST PHARMACY
169 Hillside Avenue
Monroe, LA 71206 555-0342

℞ # 123456 Date: 2/28/96
Taylor, Lisa
96 Havana Blvd.
Insert one suppository rectally at bed time, as needed for pain.
Cafergot suppositories # 12
H. Huxtable, M.D.

Figure 2. Sample label

Common Latin Terms and Abbreviations

Terms Related to Quantities

Abbreviation	Term/Phrase	Meaning
aa	Ana	Of each
q.s.	Quantum sufficiat	Sufficient quantity
ad lib.	Ad libitum	Freely, at pleasure
℥	Ounce	One ounce
f℥	Fluidounce	One fluidounce
O or pt	Pint	One pint
qt	Quart	One quart
gal	Gallon	One gallon
m	Minim	One minim
ʒ	Dram or drachm	One drachm
fʒ	Fluid drachm	One fluid drachm
gr	Grain	One grain
℈	Scruple	One scruple

Terms Related to Administration Times

Abbreviation	Term/Phrase	Meaning
qd	Quaque die	Once daily
bid	Bis in die	Twice daily
tid	Ter in die	Three times daily
qid	Quarter in die	Four times daily
am or AM	Ante meridium	In the morning
pm or PM	Post meridium	In the evening
h.s.	Hora somni	At bedtime
a.c.	Ante cibos	Before meals
p.c.	Post cibos	After meals
i.c.	Inter cibos	Between meals
om	Omne mane	Every morning
on	Omne nocte	Every night
p.r.n.	Pro re nata	When required
q.h.	Quaque hora	Every hour
q2h	Quaque secunda hora	Every two hours
q3h	Quaque tertia hora	Every three hours
q4h	Quaque quarta hora	Every four hours
q6h	Quaque sex hora	Every six hours
q8h	Quaque octo hora	Every eight hours
alt die		Every other day

Terms Related to Preparations or Remedies

Abbreviation	Term/Phrase	Meaning
amp	Ampul	Ampul
aq	Aqua	Water
aur or oto	Auristillae	Ear drops
cap	Capsula	A capsule
comp	Compositus	Compounded
cm or crem	Cremor	A cream
garg	gargarisma	Gargle
gtt	Guttae	Drops
inj.	Injectio	An injection
liq.	Liquor	A solution
mist.	Mistura	A mixture
Neb.	Nebula	A nebulizer
pil.	Pilula	A pill
pulv.	Pulvis	A powder
suppos.	Suppositorium	A suppository
troch.	Trochiscus	A lozenge

Instructions for Preparations

Abbreviation	Term/Phrase	Meaning
div.	Divide	Divide
ft	Fiat	Let it be made
m. ft.	Misce fiat	Mix to make
d.t.d.	dentur tales doses	Such doses be given
e.m.p.	ex modo prescriptio	In the manner prescribed
s	sine	Without

Method of Application

Abbreviation	Term/Phrase	Meaning
o.d. or OD	Oculus dexter	Right eye
o.l. or OL	Oculus Laevus	Left eye
o.u. or O_2	Oculo utro	Each eye or both eyes
o.s. or OS	Oculo sinister	Left eye
a.d. or AD	Aurio dextra	Right ear
a.l. or AL	Aurio Laeva	Left ear
e.m.p.	Ex. modo-prescriptio	As directed
u.d.	Ut. dictum	As directed
c	Cum	With
dext	Dexter	Right

Names for Ingredients and Products

Common Names	Meaning
Acidi tannici	Tannic acid
Ac. Sal.	Salicylic acid
Ac. Sal. Ac.	Aspirin
Aq. hamamelis	Witch hazel
Burrow's solution	Aluminum acetate solution
Camphorated oil	Camphor liniment
Camphorated Tr of opium	Paregoric
Cocoa butter	Theobroma oil
Epsom salt	Magnesium sulfate
Hydrous wool fat	Lanolin
L.C.D.	Liquid coal tar solution
Liq. calcis	Lime water
Lugol's solution	Strong iodine solution
Methylrosaniline Cl	Gentian violet
Olei lini	Linseed oil
Oleum ricini	Castor oil
Oleum morrhuae	Cod liver oil
Pulv. amyli	Starch
S.V.R.	Alcohol USP
Sweet oil	Olive oil
Whitfield's ont.	Benzoic and salicylic acids ointment

Abbreviation	Meaning
AA	Apply to affected area
AUD	Apply as directed
ASA	Acetyl salicylic acid
APAP	Acetaminophen
BCP	Birth control pills
BIW	Twice a week
BM	Bowel movement
BP	Blood pressure
BS	Blood sugar
BSA	Body surface area
ć	With
CHF	Congestive heart failure
DSS	Doccusate
IOP	Intraocular pressure
IV	Intravenous
IVP	Intravenous push
IVPB	Intravenous piggy bag
MVI	Multivitamin infusion
MOM	Milk of magnesia
N & V	Nausea and vomiting
NR	Nonrepeatable or no refill
NTG	Nitroglycerin
PBZ	Pyribenzamine
PPA	Phenylpropanolamine
SOB	Shortness of breath
SC	Subcutaneous
SL	Sublingual
tal. dos	Such doses
TIW	Thrice a week
TPN	Total parenteral nutrition
URI	Upper respiratory infection
UTI	Urinary tract infection

Vehicles

Abbreviation	Meaning
aq. bull	Boiling water
DW/or aq. dist	Distilled water
D5W	Dextrose 5% in water
NS or NSS	Normal saline (10.9% sodium chloride)
½NS	Half strength of normal saline
RL	Ringer's lactate

Prescription Problems

- A pharmacist or a nurse must perform some simple mathematical computations related to the dosage form strength, the quantity of medication, dates for the refills, and the medication costs, etc.
- As a few examples, very often, the prescription authority writes the dosage regimen for a particular strength of medication but does not write the total units of the medication. The pharmacist or the nurse then calculate the number of dosage units and dispenses them.
- Sometimes the medication available in the pharmacy is of a different strength than the one prescribed. The number of dosage units and the directions for administration have to be modified by a few calculations. The following are a few examples of the prescription problems.

Example 1

℞.

Amoxicillin 125 mg/5 mL

Sig: ii tsp tid, 7 days

How many fluid ounces of amoxicillin suspension would the patient receive?

Example 2

℞.

HCTZ 50 mg

#XC

Sig: i tab q AM for HPB

Re: 1

If this prescription was filled on April 15, when would the refill be due?

Example 3

℞.

Keflex caps 500 mg

Sig: i cap bid. 10 days

If the pharmacist has only 250 mg capsules in the inventory, how many capsules should be given to the patient?

Example 4

℞.

Dr. Zogg's otic drops 15 cc

Sig: 0.1 cc au tid, prn pain

If a calibrated dropper delivers 40 drops per 2 mL, how many drops should the patient instil in each ear every time?

Errors and Omissions

- Prescription errors are unintentional mistakes in the prescription, transcription, dispensing, and administration of medications. The patient either receives the medication incorrectly or fails to receive it all together.
- Some prescription errors include wrong patient, incorrect medication, inappropriate dose, wrong time, wrong route of administration, and wrong rate of administration. For example, the profit of a patient shows that he is allergic to codeine, and yet he receives Tylenol by an error.
- To prevent prescription or medication errors, it is a good practice to follow the "five rights principle" as a check:

  the right medication – in the right dose – to the right patient – at the right time – by the right route of administration.
- The following guideline may be helpful to a pharmacist for filling prescriptions:
  1. Make sure all the information required to fill the prescription is present.
     A systemic, step-by-step checking would be very helpful.
  2. Make sure that the information is correctly transferred to the prescription label.
  3. Make sure that the correct drug is being dispensed, whether generic or brand.

- Try to find any prescription errors in the following examples:

Example 1

Jack Ramos, M.D.
911 Hollywood Avenue
Detroit, MI-71208
Phone No. 555-1234

Name : John Doe Age: 70
Address: 96 Havana Blvd., MI-71208 Date: 2/28/96

℞

Keflex 500 mg

Sig: i cap qid, 7 days

REFILL None

DAW _____

JRamos
DEA # AD 7973142

NORTHEAST PHARMACY
169 Hillside Avenue
Monroe, LA 71206 555-0342

℞ # 123456 Date: 2/28/96
Doe, John
911 Hollywood Ave
Take one capsule four times a day for seven days
Cephalexin Caps 500 mg #40
Refill 1 J. Ramos, M.D.

	Errors
1	
2	
3	

Example 2

Pat Moody
96 Alonzo Drive
Miami, FL-71208
Phone No. 555-1234

Name : Baby Starks **Age**: 6 mo.
Address: 96 Havana Blvd., FL-71208 **Date**: 2/29/96

℞

Vantin 100 mg

Sig: ss ½ bid, 7 days

REFILL None

DAW _____

PMoody

Errors	
1	
2	
3	
4	

NORTHEAST PHARMACY
169 Hillside Avenue
Monroe, LA 71206 555-0342

℞ # 123456 Date: 2/29/95
Starks, Baby
96 Havana Blvd.
Take one-half tablet twice daily for seven days
Vantin 100 mg tablets
Refill 1 P. Moody

Example 3

Roslyn Monroe
20 Main Street
Monroe, LA 71201 Allergy: Aspirin

Date	Dr.	R #	Patient	Drug
3/1/95	Quinn	12340	Roslyn	Synthroid 0.2 mg #100, 1 daily
5/6/95	Quinn	12350	Roslyn	Hygroton 2.5 mg #70, 1 qd
7/7/95	Quinn	12369	Roslyn	Tylenol #3 #30, ii tid, prn

Doc Rogers, M.D.
12 Desiard Street
Monroe, LA-71208
Phone No. 555-1234

Name : Roslyn Monroe **Age**: 58 yrs
Address: 20 Main Street, Monroe **Date**: 7/9/95

℞

Fiorinal with Codeine
 # 40

Sig: ii caps, q4h daily

REFILL 1

DAW ✓

DRogers
DEA # DR1234567

Errors	
1	
2	
3	

Reducing and Enlarging Formulas

- Pharmacists may have to reduce or enlarge formulas for pharmaceutical preparations during their professional practice or manufacturing activities.
- Official (United States Pharmacopeia-National Formulary) formulas generally are based on the preparation of 1000 mL or 1000 g. Other formulas, like those found in the literature, may be based on the preparation of a dosage unit (e.g., 5 mL, 1 capsule) or another quantity (e.g., 100 mL). Industrial formulas may be scaled up to quantities of ingredients sufficient to prepare hundreds of thousands of dosage units in a production batch.
- In each of these instances, a pharmacist may calculate the quantities of each ingredient required for a smaller or greater quantity by reducing or enlarging the specified formula, while maintaining the correct proportion of one ingredient to the other.
- A two-step process may perform calculations to reduce or enlarge formulas:

Step 1. Using the following equation, determine the ***factor*** that defines the multiple or the decimal fraction of the amount of formula to be prepared:

Quantity of formula desired / Quantity of formula given = Factor

- A factor greater than 1 represents the multiple of the formula, and a factor less than 1 indicates the fraction of the formula to be prepared.

Step 2. Multiply the quantity of each ingredient in the formula by the factor to determine the amount of each ingredient required in the reduced or enlarged formula.

Applying the equation and factor:

If a formula for 1000 mL contains 6 g of a drug, how many grams of the drug is needed to prepare 60 mL of the formula?

Step 1. 60 mL / 1000 mL = 0.06 (factor)

Step 2. 6 g x 0.06 = 0.36 g, answer.

Example of Calculations for Reducing and Enlarging Formulas

Example 1

- From the following formula, calculate the quantity of each ingredient required to make 240 mL of calamine lotion.

Calamine	80	g
Zinc Oxide	80	g
Glycerin	20	g
Bentonite Magma	250	mL
Calcium Hydroxide Topical Solution, to make	1000	mL

Example 2

- From the following formula for artificial tears, calculate the quantity of each ingredient required to prepare a dozen 30-mL containers.

Polyvinyl Alcohol	1.4	g
Povidone	0.6	g
Chlorobutanol	0.5	g
Sterile Sodium Chloride Solution, 9% ad	100	mL

1 dozen =

Example 3

- From the following formula for an estradiol vaginal gel, calculate the quantity of each ingredient required to prepare 1 lb. of gel.

Estradiol	200	g
Polysorbate 80	1	g
Methylcellulose Gel, 2%	95	g

1 lb =

Example 4

- From the following formula for a dexamethasone ophthalmic ointment, calculate the quantity of each ingredient needed to prepare 7.5 g of ointment.

Dexamethasone Sodium Phosphate	55	mg
Lanolin, Anhydrous	5	g
Mineral Oil	10	g
White Petrolatum ad	100	g

Formulas That Specify Proportional Parts

- On a rare occasion, a pharmacist may encounter an old formula that indicates the ingredients in ‘‘parts’’ rather than in measures of weight or volume. The parts indicate the relative proportion of each of the ingredients in the formula by either weight or volume, but not both.
- A formula for solid or semisolid ingredients, therefore, may be considered in terms of grams, whereas a formula of liquids may be considered in terms of milliliters.

Example Calculation of a Formula Expressed in Parts

From the following formula, calculate the quantity of each ingredient required to make 1000 g of the ointment.

Coal Tar	5	parts
Zinc Oxide	10	parts
Hydrophilic Ointment	50	parts

Basic Steps to Follow in Compounding Drug Products

A. Carefully read and interpret the prescription. It may be necessary or helpful to consult with the prescriber and the patient about the intent of drug preparation and preferences or limitations of the patient.
B. Note any missing or confusing information; clarify, gather and add this information to the drug order.
C. Check the dose, dosage regimen, dosage form, and route of administration for appropriateness.
D. Determine preliminary compounding procedures.
E. Perform necessary calculations. If possible, have a colleague check the calculations for accuracy.
F. Select required ingredients.
G. Choose appropriate compounding equipment.
H. Using recommended techniques, prepare the product.

I. Perform quality control procedures
   - Visual inspection of the product should always be done.
   - If possible, make measurements such as capsule weight variation or pH measurement.
   - In all cases, the patient should be instructed to watch for any change in the preparation which may indicate that physical stability, chemical degradation, or microbial growth has occurred; the patient should be able to contact the pharmacist if there are questions.

J. Choose an appropriate container and package the preparation.

K. Determine an appropriate beyond use date.

L. Label the container, including recommended auxiliary labels.

M. Recheck all work.

N. Document the compounding process (use a compounding record sheet).

O. Deliver the product to the patient with appropriate consultation and check for understanding of the use of the product.

General Principles of Labelling

- Every extemporaneously prepared preparation will require a label to be produced before the product can be dispensed or sold to the patient.
- The accuracy of the label is paramount as it conveys essential information to the patient on the use of the preparation.
- Although the pharmacist may counsel patients when the medication is handed over, it is unlikely that patients will be able to remember all the information that they are given verbally. The label, therefore, acts as a permanent reminder of the key points that patients need to know.

Appearance

Correct position

- Ensure that the patient can open the container without destroying the label (e.g. when labelling cartons). Ensure the label is positioned with care and is straight, not crooked.

Clean

- Ensure the container is clean before packing the product, then clean the outside before affixing the label. Never pour any liquids into a pre-labelled container as these risks spoiling the label with drips of the medicament.

Secure

- Ensure that the label is secure before dispensing the product to the patient. The main reason for labels not sticking to product containers is because of a dirty or greasy container.

Information

Legible

- Always check label print size and quality to ensure that it can be read clearly. If there is too much information to place on one label, consider placing the additional information on a secondary label, rather than reducing the size of the print or trying to include too much information on one label.

Concise

- Although it is important that sufficient information is placed on the label, it must be remembered that it is important not to confuse the patient by placing too much information on the label. If the label contains too much information, rather than assisting patients, they may feel overwhelmed and as a result, they may read none of the information.

Adequate

- Ensure that sufficient information is given. For example, the term 'when required' raises the questions how much? How often? When required for what?

Intelligible

- The wording of the information on the label must be easily understandable and use unambiguous terms. It must always be remembered that patients may feel embarrassed to ask for further clarification on the meaning of complicated words used on the label.

Accurate

- It is important that the title is correct, the instructions are accurate and that the patient name is complete and accurate.

Notes

- Labels must include an expiry date. Labels must specify a month and year after which the product should not be used. However, in practice this can cause confusion and an alternative format is to show expiry as a single discard date: for example, 'Discard after 31.01.07'. Nowadays it is common practice to assign a maximum of a 2-week discard to any extemporaneously prepared product. Consideration should always be given to assigning a shorter discard date.
- All directions on labels should use active rather than passive verbs. For example, 'Take two' (not 'Two to be taken'), 'Use one' (not 'One to be used'), 'Insert one' (not 'One to be inserted'), etc.
- Where possible, adjacent numbers should be separated by the formulation name. For example, 'Take two three times a day' could allow for easy misinterpretation by the patient. Therefore, ideally, the wording on this label would include the formulation, e.g. 'Take two tablets three times a day'.

- The frequency and quantity of individual doses are always expressed as words rather than numerals (i.e. 'two' not '2').
- Liquid preparations for internal use usually have their dose expressed as a certain number of 5 ml doses. Therefore, if a prescription called for the dosage instruction 10 ml tds, this would be expressed as 'Take two 5 ml spoonsful three times a day'.
- Pediatric prescriptions may ask for a 2.5 ml dose: in this case, the label would read 'Give a 2.5 ml dose using the oral syringe provided'.
- Remember the label on medicine is included so that the item can be identified, and the patient instructed as to the directions for use. Therefore, the simple language should always be used.
- Never use the word 'Take' on a preparation that is not intended for the oral route of administration.
- Use 'Give' as a dosage instruction on products for children as a responsible adult should administer them.
- Only use numerals when quoting the number of milliliters to be given or taken. All other dosage instructions should use words in preference to numerals.
- Always be prepared to give the patient a verbal explanation of the label.

Auxiliary labels

- These are labels placed on drug product containers to give the patient important information needed for storing or using the product.
- They may also be used to clarify directions, provide additional instructions or reinforce directions given on the regular label.
- Common auxiliary labels are given below:
    - Shake well.
    - Keep in the refrigerator, do not freeze.
    - Shake well before use.
    - External use only.
    - May cause drowsiness.
    - Avoid sun exposure.
    - Take with food.
    - Take on an empty stomach.
    - Take with plenty of water.
    - Finish all this medication.
    - This prescription may be refilled ___ times.
    - Keep out of reach of children.
    - Protect from light.

Pharmaceutical Measurement

- Pharmaceutical measurement is an important part of pharmacy practice.
- The expertise of pharmacists in accurately weighing and measuring materials is a historical and unique skill, acquired through professional education and training. It is not an overstatement to say that patients' lives depend on it.
- The role of the pharmacist in providing pharmaceutical care includes the ability and responsibility to compound—that is, to weigh accurately, measure volume, and combine individual therapeutic and pharmaceutical components in the formulation and preparation of prescriptions and medication orders.

Measurement of Volume

- Common instruments for the pharmaceutical measurement of volume range from micropipets and burettes used in analytic procedures to large, industrial-size calibrated vessels.
- The selection of measuring instrument should be based on the level of precision required.
- In pharmacy practice, the most common instruments for measuring volume are cylindric and conical (cone-shaped) graduates. For the measurement of small volumes, however, the pharmacist often uses a calibrated syringe or, when required, a pipette.
- Generally, it is best to select the graduate with a capacity equal to or just exceeding the volume to be measured. Measurement of small volumes in large graduates tends to increase the size of the error.
- The design of a volumetric apparatus is an important factor in measurement accuracy; the narrower the bore or chamber, the lesser the error in reading the meniscus and the more accurate the measurement.
- It is essential for the pharmacist to select the proper type and capacity of the instrument for the volumetric measure and to carefully observe the meniscus at eye level to achieve the desired measurement.

Measurement of Weight

- The selection of implements from the wide range of available weights, balances, and scales for pharmaceutical measurement depends on the task at hand, from highly sensitive electronic analytic balances and prescription balances in extemporaneous compounding procedures to large-capacity scales in the industrial manufacturing and production of pharmaceutical products.
- Each instrument used must meet established standards for sensitivity, accuracy, and capacity.
- Minimally, a Class A prescription balance should be used in all prescription compounding procedures. Balances of this type have a sensitivity requirement (SR) of 6 milligrams or less with no load and with a load of 10 grams in each pan.

- To avoid errors of greater than 5% when using this balance, the pharmacist should not weigh less than 120 milligrams of material (i.e., a 5% error in a weighing of 120 milligrams = 6 milligrams). Most commercially available Class A balances have a maximum capacity of 120 grams. External weights may be added to the right-hand balance pan. The material to be weighed is placed on the left-hand pan. Powder papers are added to each pan before any additions.
- For greater accuracy than a Class A prescription balance allows, many pharmacies utilize high-precision electronic analytical balances to weigh minimal quantities. Many of these balances are capable of weighing accurately 0.1 milligrams, are self-calibrating, and are equipped with convenient digital readout features. The usual maximum capacities for balances of this precision range from about 60 grams to 210 grams depending upon the model.

Standards for Extemporaneous Dispensing

- Patients who visit a pharmacy with a prescription for a product needing to be extemporaneously prepared are entitled to expect the standards within a pharmacy to be comparable to those of a licensed manufacturing unit.
- The products produced within the pharmacy must be suitable for use, accurately prepared and prepared in such a way as to ensure the products meet the required standard for quality assurance. So, although this is small-scale production, the same careful attention to detail is required as would be found in a manufacturing unit.
- The following measures must be taken into consideration when preparing a product extemporaneously:

1. Personal hygiene

- Personal hygiene is essential. Hygiene standards within a pharmaceutical environment should be as high as, if not higher than, those found in food kitchens. This is because, within a pharmaceutical environment, medication is being prepared for patients who may already be ill.

2. Personal protective equipment

- A clean white coat should be worn to protect the compounder from the product and conversely the product from contamination from the compounder. During the compounding process, safety glasses should always be worn and, depending on the nature of the ingredients to be incorporated into the preparation, additional safety equipment (e.g. face masks, gloves) may also be required. It is the responsibility of the individual compounder to assess the risk posed by any pharmaceutical ingredient and to ensure that the correct safety equipment is in use. Similarly, long hair should be tied back and hands washed, ensuring any open cuts are covered.

3. Clean work area and equipment

- The cleanliness of the work area and equipment used during the compounding procedure is of paramount importance. The risk of contaminating the final product with either dirt or microorganisms from the surroundings or ingredients from a previous preparation can be considerable if attention is not paid to the cleanliness of the work area and equipment. Before starting to compound a product, the work area and equipment should be cleaned with a suitable solution (e.g. industrial denatured alcohol (IDA), which must be allowed to dry fully.

4. Work area

- In addition to the cleanliness of the work area, consideration needs to be given to the work area itself to ensure that it is suitable for its intended purpose. Both lighting and ventilation need to be adequate. Some pharmaceutical ingredients are highly volatile and so, if the ventilation within the work area was inadequate, this could cause problems for the compounding staff.

5. Weighing and measuring procedure

- During weighing and measuring, it can be very easy to mix up different pharmaceutical ingredients as many ingredients resemble each other. It is preferable to incorporate a weighed or measured ingredient into a product as soon as possible to prevent any accidental switching. If this is not possible when weighing or measuring more than one ingredient, place each on a piece of labelled paper as soon as it has been weighed or measured. This will avoid any accidental cross-over of ingredients.

International System of Units

- The International System of Units (SI), formerly called the metric system, is the internationally recognized decimal system of weights and measures.
- The process of changing the common systems and units of measurement (e.g., pounds, feet, gallons) to the SI metric system is termed metric transition or metrification.
- Today, the pharmaceutical research and manufacturing industry and the practice of pharmacy reflect conversion to the SI system. The reasons for the transition includes:
  - the simplicity of the decimal system,
  - the clarity provided by the base units and prefixes of the SI, and
  - the ease of scientific and professional communications through the use of a standardized and internationally accepted system of weights and measures.
- In the metric system, the three primary or fundamental units are: the **meter** for length, the **liter** for volume and the **gram** for weight.

- In addition to these basic units, the metric system includes multiples of basic units with a **prefix** to indicate its relationship with the basic unit. For example, a milliliter represents 1/1000 or 0.001 part of a liter. The following tables give prefixes and relative values of the metric system.

Prefixes and relative values of the metric system			
Subdivisions		Multiples	
Prefix	Meaning	Prefix	Meaning
nano-	10^{-9} of the basic unit	deka-	10 times the basic unit
micro-	10^{-6} of the basic unit	hecto-	10^{2} times the basic unit
milli-	10^{-3} of the basic unit	kilo-	10^{3} times the basic unit
centi-	10^{-2} of the basic unit	mega-	10^{6} times the basic unit
deci-	10^{-1} of the basic unit	giga-	10^{9} times the basic unit

Metric Weight (Gram)	
1 gram (g) = 1,000,000 microgram (µg)	1 gram (g) = 0.1 dekagram (dkg)
1 gram (g) = 1000 milligram (mg)	1 gram (g) = 0.01 hectogram (hg)
1 gram (g) = 100 centigram (cg)	1 gram (g) = 0.001 kilogram (kg)
1 gram (g) = 10 decigram (dg)	

Metric Volume (Liter)	
1 liter (L) = 1,000,000 microliter (µL)	1 liter (L) = 0.1 dekaliter (dkL)
1 liter (L) = 1000 milliliter (mL)	1 liter (L) = 0.01 hectoliter (hL)
1 liter (L) = 100 centiliter (cL)	1 liter (L) = 0.001 kiloliter (kL)
1 liter (L) = 10 deciliter (dL)	

Metric Length (Meter)	
1 meter (m) = 1,000,000 micrometer (µm)	1 meter (m) = 0.1 dekameter (dkm)
1 meter (m) = 1000 millimeter (mm)	1 meter (m) = 0.01 hectometer (hm)
1 meter (m) = 100 centimeter (cm)	1 meter (m) = 0.001 kilometer (km)
1 meter (m) = 10 decimeter (dm)	

- The pharmacist should be able to perform inter-conversions in the metric system. The following general guidelines may be helpful:
  - To prevent mistake, precede the decimal point with zero if the value is less than 1, i.e. writing 0.8 g is better than .8 g.
  - To convert milligram (large unit) to microgram (small unit), multiply by 1000 or move the decimal point three places to the right.

- To convert microgram (small unit) to milligram (small unit), divide by 1000 or move the decimal point three places to the left.
- To add, subtract, multiply or divide different metric units, first convert all the units to the same denomination. For example, to subtract 54 mg from 0.28 g, solve as 280 mg – 54 mg = 226 mg.
- Gram is represented by g or G whereas a grain is represented by gr.
- Milliliters are sometimes represented by cc, which is a cubic centimeter (cm^3).
- Microgram can be represented by µg or mcg.
- Unit names and symbols generally are not capitalized except when used at the beginning of a sentence. However, the symbol for a liter (L) may be capitalized or not. Examples: 4 L or 4 l, 4 mm, and 4 g; not 4 Mm and 4 G.
- Periods are not used following SI symbols except at the end of a sentence. Examples: 4 mL and 4 g, not 4 mL. and 4 g.
- Symbols should not be combined with spelled-out terms in the same expression. Examples: 3 mg/mL, not 3 mg/milliliter.
- Plurals of unit names, when spelled-out, have an added **s**. Symbols for units, however, are the same in singular and plural. Examples: 5 milliliters or 5 mL, not 5 mLs.
- Decimal fractions are used, not common fractions. Examples: 5.25 g, not 51⁄4 g.
- In selecting symbols of unit dimensions, the choice generally is based on selecting the unit that will result in a numeric value between 1 and 1000. Examples: 500 g, rather than 0.5 kg; 1.96 kg, rather than 1960 g; and 750 mL, rather than 0.75 L.

Examples:

Example 1

- If a tablet weighs 0.26 gram, one-fourth of the same tablet weighs how many milligrams?

1g =

Example 2

- If a vial contains 80 mg of a drug in 2 mL, how many micrograms of the drug are present in 0.025 mL?

Example 3

- Add 1.25 g, 35 mg and 80 mcg and express the result in milligrams.

Relation of the SI to Other Systems of Measurement

- In addition to the International System of Units, the pharmacy student should be aware of two other systems of measurement: the **avoirdupois** and **apothecaries'** systems.
- The apothecaries' system, once the predominant pharmacist's system of volumetric and weight measure, has also largely been replaced by the SI.
  - This system has a unit for weight and volume only.
  - The basic unit of weight is a **grain** (gr) and that of the volume is **minim** (m).
  - Unlike the metric units, the amount is expressed in **Roman** numerals **after** the symbol. For example, 1/2 grain is expressed as gr ss but not 1/2 gr. Twenty minims are expressed as m xx but not 20 m. Some physicians still use Arabic numerals.
- The next table gives the apothecaries' weight and volume measures.

Apothecaries' Liquid Measures	Apothecaries' Weight Measures
1 fluid dram (f 3) = 60 minims (m)	1 scruple = 20 grains (gr)
1 fluid ounce (f3) = 8 fluid dams	1 dram (f 3) = 3 scruples
1 pint (pt or O) = 16 fluid ounces	1 ounce (3) = 8 dram
1 quart (qt) = 2 pints	1 pound (lb) = 12 ounces
1 gallon (gal or C) = 4 quarts	1 pound (lb) = 5760 grains

- The avoirdupois system, widely used in the United States in measuring body weight and in selling goods by the ounce or pound, is slowly giving way to the international system.

1 ounce (oz) = 437.5 grains

1 pound (lb, Avoirdupois) = 7000 grains

Interconversions

- A pharmacist may encounter more than one system of measurement. Therefore, it is necessary to convert all quantities to the same system of measurement. Some commonly used equivalents are shown in the next table.

Apothecary	Metric	Commonly Used Equivalent
1 grain	64.8 mg	65 mg
1 ounce	31.1 g	30 g
1 pound	373.2 g	454 g (avoirdupois)
1 minim	0.062 mL	0.06 mL
1 fluid ounce	29.57 mL	30 mL
-	1 kg	2.2 lb

Roman Numerals:

- Roman numerals are used with the apothecary's system of measurement to designate quantities in prescriptions.
- The student may recall the eight letters of fixed values used in the Roman system:

ss	=	1/2	L or l	=	50
I or i	=	1	C or c	=	100
V or v	=	5	D or d	=	500
X or x	=	10	M or m	=	1000

- A letter repeated once or more, repeats its value (e.g., xx = 20; xxx = 30).
- One or more letters placed after a letter of greater value increases the value of the greater letter (e.g., vi = 6; xii = 12; lx = 60).
- A letter placed before a letter of greater value decreases the value of the greater letter (e.g., iv = 4; xl = 40).
- Capital or lower-case letters may be used.
- A ‘‘j’’ may be used as the final ‘‘i’’ in a sequence (e.g., viij).
- When Roman numerals are used, the tradition of placing the numerals after the term or symbol generally is followed (e.g., capsules no. xxiv; fluidounces xij).

Household Measures

- Though inaccurate, the use of household measures is on the rise because of increased home health care delivery. These measures are designed for the convenience of the patient. Therefore, they are used for the directions on labels for the patients. They should not be used for calculations in compounding or conversions from one system to the other.
- The household measures are shown in the following table:

1 teaspoonful (tsp)	=	5 mL
1 dessertspoonful (dssp)	=	8 mL
1 tablespoonful (tbsp)	=	15 mL
1 ounce	=	2 tbsp or 30 mL
1 coffee cup	=	6 fluidounces
1 glass	=	8 fluidounces
1 quart (qt)	=	1 liter

Examples:

Example 1

- If a prescription calls for gr ii thyroid desiccated tablets and the pharmacist has gr ss tablets in stock, how many tablets or gr ss should be provided?

Example 2

- How many doses of ʒ iv are present in O iiss of Maalox?

Example 3

- A doctor ordered morphine sulphate gr 2/5 and the pharmacist has a stock solution of gr 1/8 per milliliter of morphine sulfate. How many milliliters of the stock solution is required to fill the prescription?

Example 4

- A suspension contains 100 mg/5 mL of a srug. If the patient takes one teaspoonful of the suspension twice daily for 10 days, how many grams of the drug does the patient consume?

Example 5

- If a teaspoonful of cough syrup is to be given three times daily for five days, how many fluid ounces of the medication should be dispensed?

Solutions

Solutions

Introduction and Overview of Solutions

- Essentially a solution is a homogeneous liquid preparation that contains one or more dissolved medicaments.
  - Since, by definition, active ingredients are dissolved within the vehicle, uniform doses by volume may be obtained without any need to shake the formulation. This is an advantage over some other formulation types, e.g. suspensions.
- Solutions are traditionally one of the oldest dosage forms used in the treatment of patients and afford rapid and high absorption of soluble medicinal products.
- Solutions are particularly use for individuals who have difficulty in swallowing solid dosage forms (for example, pediatric, geriatric, intensive care and psychiatric patients).
- Generally, water is chosen as the vehicle in which medicaments are dissolved since it is non-toxic, non-irritant, tasteless, relatively cheap and many drugs are water-soluble.
- Problems may be encountered where active drugs are not particularly water-soluble or suffer from hydrolysis in aqueous solution. In these cases, it is often possible to formulate a vehicle containing water mixed with a variety of other solvents.

Advantages and Disadvantages of Solutions as Dosage Forms

Advantages

- Drug available immediately for absorption.
- Flexible dosing.
- May be designed for any route of administration.
- No need to shake the container.
- Facilitates swallowing in difficult cases.

Disadvantages

- Drug stability often reduced in solution
- Difficult to mask unpleasant tastes
- Bulky, difficult to transport and prone to container breakages
- Technical accuracy needed to measure dose on the administration
- Some drugs poorly soluble
- Measuring device is needed for administration

General Method of Preparation of Solutions

1. The following general method should be used in the preparation of a solution:
2. Write out the formula either from the prescription (unofficial) or an official text (official).
3. Calculate the quantities required for each ingredient in the formula to produce the required final volume.
4. Prepare a suitable label.
5. Weigh all solids.
6. Identify the soluble solids and calculate the quantity of vehicle required to dissolve the solids fully. If more than one solid is to be dissolved, they are dissolved one by one, in order of solubility (i.e. the least soluble first). In almost all cases, dissolution will take place in a glass beaker, not a conical measure.
7. Transfer the appropriate amount of vehicle to a glass beaker (generally three-quarter of the vehicle volume).
8. If necessary, transfer the solid to a glass mortar and use the glass pestle to reduce particle size to aid dissolution.
9. Transfer the solid to the beaker and stir to aid dissolution. If a mortar and pestle have been used to reduce particle size, ensure that the mortar is rinsed with a little vehicle to ensure complete transfer of the powders.
10. Examine the solution by holding it against the light. If particles of foreign matter are visible, strain the solution through a plug of cotton-wool placed in a funnel, and, when the solution has passed through, pour a little of the aqueous vehicle on the wool so that the solution in is displaced.
11. When all the solid(s) has/have dissolved, transfer the solution to the graduated measure that will be used to hold the final solution.
12. Rinse out the beaker in which the solution was made with a portion of the vehicle and transfer the rinsing to the graduated measure.
13. Add any remaining liquid ingredients to the graduated measure and stir.
14. Make up to final volume with the remaining vehicle.
15. Transfer to a suitable container and close it by cork or screw cap then polish the container to remove the fingermarks.
16. Attach the label and dispense to the patient.

Tips and Key Points

- Dissolution will normally take place in a glass beaker, not a graduated measure.
- During the dissolution phase, solutions should be stirred gently and uniformly to avoid air entrapment which may result in foaming of the solution.
- If available, automatic stirring devices may be useful in assisting the production of a uniform product and can be time-saving.
- It is best to stir continuously when combining ingredients into a solution (either liquid or solid ingredients). By stirring continually during incorporation, high concentration planes within the fluid body, which might increase the likelihood of incompatibilities, will be avoided.
- To aid dissolution, high-viscosity liquid components should be added to those of lower viscosity.
- In complex solutions, organic components should be dissolved in alcoholic solvents and water-soluble components dissolved in aqueous solvents.
- Aqueous solutions should be added to alcoholic solutions with stirring to maintain the alcohol concentration as high as possible – the reverse may result in separation of any dissolved components.

Solutions – Sample Prescription 1

Simple Syrup

R_x

Sucrose		85 g
Water	to	100 mL
Ft: Simple syrup	send:	25 mL

Comments:

- A syrup is a concentrated or nearly saturated solution of sucrose in water.
- A simple syrup contains only sucrose and purified water (e.g. Syrup USP). Syrups containing pleasantly flavored substances are known as flavoring syrups (e.g. Cherry Syrup, Acacia Syrup, etc.). Medicinal syrups are those to which therapeutic compounds have been added (e.g. Guaifenesin Syrup).
- Syrup, USP contains 850 gm sucrose and 450 ml of water in each liter of syrup.
- Although very concentrated, the solution is not saturated. Since 1 gm sucrose dissolves in 0.5 ml water, only 425 ml of water would be required to dissolve 850 gm sucrose. This slight excess of water enhances the syrup's stability over a range of temperatures, permitting cold storage without crystallization.
- The high solubility of sucrose indicates a high degree of hydration or hydrogen bonding between sucrose and water. This association limits the further association between water and additional solutes. Hence, syrups have a lower solvent power than water and "salting out" may be a problem.
- The syrup is protected from bacterial contamination by virtue of its high solute concentration. More dilute syrups are good media for microbial growth and require the addition of preservatives.
- Three methods may be used to prepare syrups:
  - Solution with heat
  - Agitation without heat
  - Percolation
- Although the hot method is quickest, it is not applicable to syrups of thermo-labile or volatile ingredients. When using heat, the temperature must be carefully controlled to avoid decomposing and darkening the syrup (caramelization).

Solutions – Sample Prescription 1

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
--- --- --- ---	
Date:	Use:
Discard Date:	Color:

Solutions – Sample Prescription 2

Cough Syrup

R_x

Ammonium Chloride	4 g
Liquid Extract of Liquorice	5 mL
Syrup	50 mL
Water q.s. to	100 mL

Ft: Cough syrup, mitte: 50 mL

Sig. i tsp, tid

Comments:

- Ammonium chloride is a white crystalline salt that is highly soluble in water. It is used as an expectorant in cough medicine. Its expectorant action is caused by irritative action on the bronchial mucosa. This causes the production of excess respiratory tract fluid which presumably is easier to cough up. Ammonium salts are an irritant to the gastric mucosa and may induce nausea and vomiting.

- Liquid extract of liquorice is a dark colored liquid with a characteristic aroma of Liquorice. It is obtained by extracting liquorice in the form of a coarse powder with water and then adding ethanol to obtain a content of 18% in the finished product. It is a sweetening substance with mild expectorant action. It is widely used in the manufacture of herbal medicines as the basis for liquid cough preparations.

Solutions – Sample Prescription 2

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
--- --- --- ---	
Date:	Use:
Discard Date:	Color:

Solutions – Sample Prescription 3

Belladonna Mixture Pediatric BP

R_x

Belladonna Tincture	30	mL
Syrup	200	mL
Glycerol	100	mL
Benzoic acid solution	20	mL
Compound orange spirit	2	mL
Water to	1000	mL

Fait: mist. Mitte 50 mL

Sig. i t.s.p., t.i.d., p.c.

Comments:

- Belladonna produces many effects in the body, including relief from spasms of the gastrointestinal tract, the bladder, and the biliary tract. This mixture is helpful in controlling conditions such as colitis, spastic bladder, infant colic, renal and biliary colic, and irritable bowel syndrome.

- This mixture is used to treat colic. The dose of this product is 5 ml for a child of up to 1 year old and 10 ml for a child of 1-5 years.

- This product would be recently prepared as Benzoic acid BP acts as preservatives and therefore would attract a four-week discard date.

Solutions – Sample Prescription 3

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
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Date:	Use:
Discard Date:	Color:

Solutions – Sample Prescription 4

Potassium Citrate Mixture BP

R_x

Potassium citrate	300	g
Citric acid	50	g
Syrup	250	mL
Quillaia Tincture	10	mL
Lemon spirit	5	mL
Double strength chloroform water	300	mL
Water to	1000	mL

Fait mist. Mitte 50 mL

Sig. 10 mL well diluted with water, t.i.d., p.c.

Comments:

- Citric acid and potassium citrate are the active ingredients. Potassium citrate makes the urine less acidic and causes a mild diuresis. Both solids are soluble 1 in 1 of water.

- Lemon spirit, which is lemon oil in alcoholic solution, is a flavoring agent. The oil tends to displace from solution in an aqueous medium. The quillaia tincture is a surfactant used to any displaced lemon oil. The syrup is a sweetening agent.

- Chloroform is an anaesthetic when inhaled. When taken orally by mouth, it has a pleasant taste and causes a sensation of warmth. Orally it is used as a carminative, a flavouring agent and a preservative. In products made extemporaneously, it is added either as chloroform-water (2.5% v/v chloroform in water), Double-strength chloroform-water (5% v/v chloroform in water) or as chloroform sprit.

- The solids should be dissolved in double strength chloroform water and syrup. The quillaia tincture should be added before the lemon spirit is added with stirring so that immediate emulsification of the oil would be achieved if required.

- The label should contain **"shake well before use"** and the medicine should be diluted with plenty of water. The shelf life of about 2-3 weeks is applicable.

- This mixture is used for alkalinization of urine to relieve discomfort in mild urinary tract infections or inflammatory conditions of the bladder (e.g. cystitis).

Solutions – Sample Prescription 4

Calculation:

Procedure:

Use:

Label:

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Date:	Use:
Discard Date:	Color:

Solutions – Sample Prescription 5

Rehydration Solution

R_x

Potassium Citrate		0.050	g
Sodium Chloride		0.045	g
Sodium Bicarbonate		0.010	g
Dextrose		1.000	g
Chloroform water	to	5.000	mL

Fait mist. Mitte x doses

Sig. e.m.p.

Comments:

- Rapid fluid loss associated with diarrhea can lead to dehydration and ultimately death in some patients, particularly infants. During diarrhea, the small intestine secretes far more than the normal amount of fluid and electrolytes, and this simply exceeds the ability of the large intestine to reabsorb it. This fluid loss can lead to a progressive loss of blood volume culminating in hypovolemic shock.

- The goal in diarrhea treatment is to replace lost fecal water with an oral rehydration solution. Therapy is based on the observation that glucose is actively absorbed from the small intestine, even during bouts of diarrhea. This active transport of glucose is advantageous because it is coupled with sodium absorption. Sodium absorption promotes anion absorption, which in turn promotes water absorption.

- To produce maximal absorption of sodium and water, studies have demonstrated that the optimal concentrations of glucose and sodium in an isotonic solution are 110 mM (2%) glucose and 60 mEq/L of sodium ion, respectively. Bicarbonate and/or citrate ions are also included in these solutions to help correct the metabolic acidosis caused by diarrhea and dehydration.

Use: For treatment of dehydration in infants suffering from vomiting and diarrhea.

Solutions – Sample Prescription 5

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
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Date:	Use:
Discard Date:	Color:

Solutions – Sample Prescription 6

Anti-rheumatic Mixture

R_x

Sodium salicylate	0.06	g
Sodium bicarbonate	0.045	g
Sodium metabisulfite	0.015	g
Tincture of orange peel	0.5	mL
Peppermint water to	10	mL

Fait mist. Mitte 60 mL

Sig. ii t.s.p., t.i.d., p.c.

Comments:

- Sodium salicylate is an analgesic and anti-rheumatic. Sodium bicarbonate is an antacid. Sodium metabisulfite is an antioxidant. Tincture of orange peel is a flavoring agent. Peppermint water is a vehicle and flavoring agent.

- Sodium metabisulfite should be dissolved first to prevent any oxidation of Sodium salicylate when added to the solution.

- Sodium bicarbonate should also be added before Sodium salicylate to make the solution alkaline to prevent the conversion of the salt to free acid.

- Sodium salicylate tends to cause gastric irritation due to the liberation of free salicylic acid by the action of gastric juice. For this reason, an equivalent amount of Sodium bicarbonate is usually employed with Sodium salicylate.

Use: As analgesic and anti-rheumatic.

Solutions – Sample Prescription 6

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
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Date:	Use:
Discard Date:	Color:

Solutions – Sample Prescription 7

Compound Sodium Chloride Mouth Wash

R_x

Sodium Chloride		2	g
Sodium Bicarbonate		1	g
Amaranth Solution		2	mL
Peppermint water	to	200	mL

Fait mouth wash. Mitte 50 mL

Sig. Mouth wash q.i.d.

Comments:

- A mouth wash is an aqueous solution which is most often used for its detergents, refreshing, or antiseptic effect.
- This preparation is used as mouthwash to cleanse and freshen the mouth. It is suitable for treatment of superficial infections if used frequently.
- Sodium bicarbonate can dissolve mucous. It is frequently added to sprays and washed for the throat and nose.
- Sodium chloride is used to make the preparation isotonic.
- Amaranth solution is used as a coloring agent and peppermint water is used to impart pleasant taste and odour to the preparation.
- The patient would be advised that 20 ml of mouthwash should preferably be diluted with an equal volume of warm water.
- As the product is mouthwash, **'Not to be taken', 'Do not swallow in large amounts' and 'Dilute with an equal volume of water before using'** would all be required on the product label.

Solutions – Sample Prescription 7

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
--- --- --- ---	
Date:	Use:
Discard Date:	Color:

Solutions – Sample Prescription 8

Potassium Permanganate 0.2% Solution

R_x

Potassium Permanganate Solution 0.2% w/v

Freshly boiled and cooled purified water to 100 mL

Fait solution. Mitte 50 mL

Sig. Dilute 1 in 20 and use as a wet dressing alt die

Comments:

- This preparation is used for cleansing wounds and deodorising suppurating eczematous reactions and wounds.
- Potassium permanganate is commonly used as a solution at a strength of 1 in 10000 (British National Formulary). 0.2% w/v solution is the same as a 1 in 500 solution which, when diluted 20 times, becomes a 1 in 10000 solution.
- Potassium permanganate is a crystalline powder soluble 1 in 16 in cold water and freely soluble in boiling water. It needs to be ground under water into a powder for ease of dissolution.
- Freshly boiled and cooled purified water would be used as the vehicle, as no preservative will be added and the solution is intended for application to a wound.
- Potassium permanganate is an oxidizing substance, therefore there is a risk of explosion. To prevent this, add some freshly boiled and cooled purified water to a glass mortar and grind under water.
- Potassium permanganate stains and so a porcelain mortar would not be suitable In addition, a glass mortar is always used for grinding as crystalline substances can scratch a porcelain mortar.
- A fluted amber bottle with a child-resistant closure would be most suitable as a container since the preparation is a solution for external use.
- Additional label that reads ‘For external use only’ should be used.
- The patient should be advised that solutions of **potassium permanganate stain skin and clothing**. A suitable caution could be added to the final label. The patient is also advised to **discontinue use if the skin becomes dry.**

Solutions – Sample Prescription 8

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
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Date:	Use:
Discard Date:	Color:

Suspensions

Suspensions

Introduction

- Suspensions may be defined as preparations containing finely divided drug particles distributed somewhat uniformly throughout a vehicle in which the drug exhibits a minimum degree of solubility.
- In contrast to solutions, in a suspension, at least one of the ingredients is not dissolved in the vehicle and so the preparation will require shaking before a dose is administered.
- Common pharmaceutical products that are suspensions include ear drops, enemas, inhalations, lotions and mixtures for oral use.
- British Pharmacopoeia (BP) defined oral suspensions as follows: "Oral suspensions are oral liquids containing one or more active ingredients suspended in a suitable vehicle. Suspended solids may slowly separate on standing but are easily redispersed.

Advantages and disadvantages of suspensions as dosage forms

Advantages

1. Insoluble drugs may be more palatable.
2. Insoluble drugs may be more stable.
3. Suspended insoluble powders are easy to swallow.
4. The suspension format enables easy administration of bulk insoluble powders.
5. Absorption will be quicker than solid dosage forms.
6. Lotions will leave a cooling layer of medicament on the skin.
7. It is theoretically possible to formulate sustained-release preparations.

Disadvantages

1. Preparation requires shaking before use.
2. Accuracy of the dose is likely to be less than with equivalent solution.
3. Storage conditions can affect disperse systems.
4. Suspensions are bulky, difficult to transport and prone to container breakages.

Diffusible and indiffusible suspensions

Diffusible suspensions

- These are suspensions containing light powders which are insoluble, or only very slightly soluble in the vehicle, but which on shaking disperse evenly throughout the vehicle for long enough to allow an accurate dose to be poured.
- Examples of diffusible powders includes: Light Kaolin (insoluble in water), Light Magnesium Carbonate (very slightly soluble in water) and Magnesium Trisilicate (insoluble in water).

Indiffusible suspensions

- These are suspensions containing heavy powders which are insoluble in the vehicle and which on shaking do not disperse evenly throughout the vehicle long enough to allow an accurate dose to be poured.
- Examples of indiffusible powders includes: Aspirin, Calamine, Chalk and Zinc Oxide.
- In the preparation of indiffusible suspensions, the main difference when compared to diffusible suspensions is that the vehicle must be thickened to slow down the rate at which the powder settles. This is achieved by the addition of a suspending agent.

Choice of suspending the agent

- The amount of suspending agent used in any given formulation depends on the volume of the vehicle being thickened. It does not vary with the amount of powder in the preparation.
- A suspending agent is intended to increase the viscosity of the vehicle and therefore slow down sedimentation rates. This outcome could also be achieved by decreasing the particle size of the powder in suspension.
- The most common suspending agents used in extemporaneous dispensing are:
  - Tragacanth BP (internal or external suspensions) (generally used as 0.2 g powder per 100 mL suspension).
  - Compound Tragacanth Powder BP (containing: 15% Tragacanth BP, 20% Acacia BP, 20% Starch BP and 45% Sucrose BP) (internal suspensions) (generally used as 2 g powder per 100 mL suspension).
  - Bentonite BP (external suspensions) (used generally as 2-3%).

General method for the preparation of a suspension containing a diffusible solid

1. Calculate the quantities of vehicle required to dissolve any soluble solids.
2. Weigh all solids on a Class II or electronic balance.
3. Dissolve all soluble solids in the vehicle in a small glass beaker using the same procedures as described in solution.
4. Mix any insoluble diffusible powders in a porcelain mortar using the 'doubling-up' technique to ensure complete mixing (see below).
5. Add a small quantity of the vehicle (which may or may not be a solution of the soluble ingredients) to the solids in the mortar and mix using a pestle to form a smooth paste.
6. Add further vehicle in small quantities and continue mixing until the mixture in the mortar is of pourable consistency.
7. Transfer the contents of the mortar to a conical measure of suitable size.
8. Rinse out the mortar with more vehicle and add any rinsings to the conical measure.

9. Add remaining liquid ingredients to the mixture in the conical measure. (These are added now, as some may be volatile and therefore exposure whilst mixing needs to be reduced to prevent loss of the ingredient by evaporation.)
10. Makeup to final volume with the vehicle.
11. Stir gently, transfer to a suitable container, ensuring that all the solid is transferred from the conical measure to the bottle, and label ready to be dispensed to the patient.
12. Check the solubility in the vehicle of all solids in the mixture.

General method for the preparation of a suspension containing an indiffusible solid

- Oral indiffusible suspensions are prepared using the same basic principles as for oral diffusible suspensions. The main difference is that the preparation will require the addition of a suspending agent.
- The suspending agent of choice will normally be combined with the indiffusible solid using the 'doubling-up' technique before incorporation into the product.

1. Check the solubility in the vehicle of all solids in the mixture.
2. Calculate the quantities of vehicle required to dissolve any soluble solids.
3. Weigh all solids on a Class II or electronic balance.
4. Dissolve all soluble solids in the vehicle in a small glass beaker.
5. Mix any insoluble indiffusible powders and the suspending agent in a porcelain mortar using the 'doubling-up' technique to ensure complete mixing.
6. Add a small quantity of the vehicle (which may or may not be a solution of the soluble ingredients) to the solids in the mortar and mix using a pestle to form a smooth paste.
7. Add further vehicle in small quantities and continue mixing until the mixture in the mortar is of pourable consistency.
8. Transfer the contents of the mortar to a conical measure of suitable size.
9. Rinse out the mortar with more vehicle and add any rinsings to the conical measure.
10. Add remaining liquid ingredients to the mixture in the conical measure.
11. Makeup to final volume with the vehicle.
12. Stir gently, transfer to a suitable container, ensuring that all the solid is transferred from the conical measure to the bottle, and label ready to be dispensed to the patient.

Note: The 'doubling-up' technique

1. Weigh the powder present in the smallest volume (powder A) and place in the mortar.
2. Weigh the powder present in the next largest volume (powder B) and place on labelled weighing paper.
3. Add approximately the same amount of powder B as powder A in the mortar.
4. Mix well with pestle.
5. Continue adding an amount of powder B that is approximately the same as that in the mortar and mix with the pestle, i.e. doubling the amount of powder in the mortar at each addition.
6. If further powders are to be added, add these in increasing order of volume as in parts 3, 4 and 5 above.

Suspensions as an emergency formulation

- Pharmacists may be asked to prepare a suitable liquid preparation for patients who are unable to swallow tablets or capsules. Occasionally, the medicament required may only be available commercially as a solid dosage form. The pharmacist may be expected to prepare a liquid product from the commercially available solid dosage form. This normally involves crushing of tablets or opening of capsules to provide the powdered drug to prepare a suspension.
- When preparing a suspension from solid dosage forms, it must always be remembered that tablets and capsules will contain unknown excipients as well as the nominal quantity of the drug. The bioavailability of the drug is likely to be unknown, and if possible, a pure sample of the powdered drug should be obtained in order to produce a suspension without extraneous components. In cases where the solid dosage form is the only source of the drug, Tragacanth Powder or Compound Tragacanth Powder are usually suitable suspending agents.

Suspensions – Sample Prescription 1

Magnesium Trisilicate Mixture

R_x

Magnesium Trisilicate	50	g
Light Magnesium Carbonate	50	g
Sodium Bicarbonate	50	g
Concentrated Peppermint Emulsion	2.5	mL
Double Strength Chloroform water	500	mL
Potable Water to	1000	mL

Fait suspension. Mitte 50 mL

Sig. II tsp tds

Comments:

- This mixture is used to treat indigestion/dyspepsia. This is an official preparation, therefore the formula is safe and suitable for the purpose. The dose of 10 ml three times a day is consistent with the recommended dosage.

- Double Strength Chloroform Water BP is included in this product as the preservative. Concentrated Peppermint Emulsion is included in this product as the flavouring as per the product formula.

- Sodium bicarbonate is soluble 1 in 11 ml water, a minimum of 11 ml of water would be required to dissolve 1g of sodium bicarbonate. The final volume of required (50 ml) will contain 2.5 g of Sodium Bicarbonate. As 1 g of sodium bicarbonate is soluble in 11 ml, 2.5 g is soluble in 27.5 ml (2.5 x 11 = 27.5 ml). Therefore, a minimum of 27.5 ml of the vehicle would be required to the 2.5 g of sodium bicarbonate in this example. For ease of compounding choose a convenient volume of vehicle, say 30 ml, in which to dissolve the solute initially.

- In this example, it would be incorrect to dissolve the Sodium Bicarbonate in 30 ml of Double Strength Chloroform Water as the final volume of the preparation only contains 25 ml. In this case, all the Double Strength Chloroform Water is used (25 mL) along with enough potable water to reach the desired volume (approximately 5 ml). It is also important not to dissolve the Sodium Bicarbonate in 30 mL of potable water, as when the 25 mL of Double Strength Chloroform Water is added to the preparation, the final volume would be greater than 50 mL.

- Magnesium Trisilicate is added to the mortar first although the weights of the insoluble solid are identical. This is because the volume occupied by the powders differs markedly. The Magnesium Trisilicate occupies the smallest volume and therefore it is the first powder to be added to the mortar.

- A plain amber bottle with a child-resistant closure would be most suitable as the preparation is a suspension for internal use.

- **'Shake the bottle'** will need to be added to the label as the product is a suspension and will need shaking before use to ensure an accurate dose is measured.

- The patient would be advised to mix two 5 ml spoonsful with an equal volume of water and take three times a day. In addition, the discard date and the need to shake the bottle before a dose is measured would be highlighted.

Suspensions – Sample Prescription 1

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
---------- ---------- ---------- ----------	
Date:	Use:
Discard Date:	Color:

Suspensions – Sample Prescription 2

Pediatric Chalk Mixture

R_x

Chalk	20	g
Tragacanth	2	g
Concentrated Cinnamon Water	4	mL
Syrup	100	mL
Double Strength Chloroform water	500	mL
Potable Water to	1000	mL

Fait suspension. Mitte 50 mL

Sig. II tsp qds

Comments:

- This preparation is used to treat diarrhea in children.
- Concentrated Cinnamon Water is included in this product as a flavouring agent. Double Strength Chloroform Water is included as a preservative.
- Tragacanth is included in this mixture because Chalk is an indiffusible solid and therefore it is necessary to add a suspending agent. They are admixed by the 'doubling-up' technique to ensure even mixing and therefore the successful suspension of the indiffusible chalk.
- The Concentrated Cinnamon Water is the last ingredient to be added prior to making up to volume because it is a volatile ingredient.
- The parent or guardian would be advised to give two 5 ml spoonful's four times a day. The word **'give'** is used here as the preparation is for a child and so will be administered by a parent or guardian. In addition, the discard date and the need to **shake the bottle** before a dose is measured would be highlighted.

Suspensions – Sample Prescription 2

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
---------- ---------- ---------- ----------	
Date:	Use:
Discard Date:	Color:

Suspensions – Sample Prescription 3

Clobazam Suspension

R_x

Tabs qs Clobazam	10	mg
Peppermint Water	2%	v/v
Glycerol	6%	v/v
Syrup	25%	v/v
Suspending agent	2%	w/v
Freshly boiled and cooled purified water **to**	100%	

Fait suspension. Mitte 10 doses

Sig. 10 mg tds

Comments:

- This preparation is used to treat epilepsy and anxiety.
- Clobazam is only available commercially as 10 mg tablets. The patient is required to take 10 mg at each dose but unfortunately cannot swallow solid-dose preparations. The hospital pharmacy gives you the formula that has been used whilst the patient was in the hospital.
- As the quantity of suspending agent required was indicated to be 2%, Compound Tragacanth Powder was chosen as the suspending agent as this is a suitable quantity to include to produce a reasonable suspension. Tragacanth itself is normally used in concentrations of 0.2%.
- **"Shake the bottle"** will need to be added to the label as the product is a suspension and will need shaking before use.
- The British National Formulary recommends the following cautions: **"Warning: May cause drowsiness" "Do not stop taking this medicine except on your doctor's advice."** The last would only be required if the product was being used to treat epilepsy.

Suspensions – Sample Prescription 3

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
--- --- --- ---	
Date:	Use:
Discard Date:	Color:

Emulsions

Emulsions

Introduction

- An emulsion is essentially a liquid preparation containing a mixture of oil and water that is rendered homogeneous by the addition of an emulsifying agent.
  - The emulsifying agent ensures that the oil phase is finely dispersed throughout the water as minute globules.
  - This type of emulsion is termed an 'oil-in-water' emulsion.
  - The oily phase (disperse phase) is dispersed through the aqueous phase (continuous phase).
  - Generally all oral dose emulsions tend to be oil-in-water as the oily phase is usually less pleasant to take and more difficult to the flavor.
  - 'Water-in oil' emulsions can be formed, but these tend to be those with external uses.

- All emulsions will require an additional label 'Shake the bottle'.

Advantages and disadvantages of emulsions as dosage forms

Advantages

1. Unpalatable oils can be administered in a palatable form.
2. Unpalatable oil-soluble drugs can be administered in a palatable form.
3. The aqueous phase is easily flavoured.
4. The oily sensation is easily removed.
5. The rate of absorption is increased.
6. It is possible to include two incompatible ingredients, one in each phase of the emulsion.

Disadvantages

1. Preparation needs to be shaken well before use.
2. A measuring device is needed for administration.
3. A degree of technical accuracy is needed to measure a dose.
4. Storage conditions may affect stability.
5. Bulky, difficult to transport and prone to container breakages.
6. Liable to microbial contamination which can lead to cracking.

Extemporaneous Preparation

General Method

- The theory of emulsification is based on the study of the most naturally occurring emulsion, milk. If examined closely, milk will be seen to consist of fatty globules, surrounded by a layer of casein, suspended in water. When a pharmaceutical emulsion is made, the principal considerations are the same.
- The object is to divide the oily phase completely into minute globules, surround each globule with an envelope of suspending agent (e.g. Acacia) and finally suspend the globules in the aqueous phase.

Continental and dry gum method

- Although emulsions may be made by a variety of methods, extemporaneously prepared emulsions for oral administration are usually made by the continental or dry gum method, where the emulsion is formed by mixing the emulsifying gum (usually Acacia) with the oil which is then mixed with the aqueous phase.
- Internal emulsions prepared by the dry gum method should contain, in addition to the oil to be emulsified:
  - A vehicle: Freshly boiled and cooled purified water is normally used because of the increased risk of microbial contamination.
  - A preservative: This is usually added to the product as Double Strength Chloroform Water at 50% of the volume of the vehicle.
  - An emulsifying agent (or emulgent): The quantity of emulsifying agent added is determined by the type of oil to be emulsified and the quantity of emulsion to be prepared
  - Additional flavouring and colouring: If required

Calculation of the amount of emulsifying agent to be used in the preparation of an emulsion

- The amount of emulsifying agent used is dependent on the amount and type of oil to be emulsified.
- Oils can be divided into three categories, fixed oils, mineral oils and aromatic (volatile) oils.
- The proportions of oil to aqueous to gum is illustrated in the table given below. These proportions are important when making a primary emulsion, to prevent the emulsion breaking down on dilution or storage.
- Accurate weighing and measuring of the components in the primary emulsion are important when making the primary emulsion to prevent le emulsion breaking down on storage or dilution.

Ratio of oily phase to aqueous phase to gum in a primary emulsion

Type of oil	Examples	Oil (by volume)	Aqueous (by volume)	Gum (by weight)
Fixed	Arachis Oil	4	2	1
	Castor Oil			
	Cod Liver Oil			
Mineral	Liquid Paraffin	3	2	1
Volatile	Cinnamon Oil	2	2	1
	Peppermint Oil			

Wet gum method

- The proportions of oil, water and emulsifying agent for the preparation of the primary emulsion are the same as those used in the dry gum method. The difference is in the method of preparation.
- Using this method the acacia powder is added to the mortar and then triturated with the water until the gum is dissolved and a mucilage formed.
- The oil is then added to the mucilage drop by drop whilst triturating continuously. The trituration continues until all the oil has been added.
- When all the oil has been added, triturate until a smooth primary emulsion is obtained.
- In the main, this method has fallen out of favour as it takes much longer than the dry gum method.
- It should be noted that there is less chance of failure with this method provided the oil is added very slowly and in small quantities.

Key Points

- It is relatively easy for an emulsion to crack, resulting in a failed product. The key points given below are critical when preparing emulsions.
  - All equipment should be thoroughly cleaned, rinsed with water and carefully dried before use, particularly measures, mortars and pestles.
  - Accurate quantities are essential. Check weighing/measuring technique and minimize transference losses; for example, allow oil to drain from the measure.
  - Have all ingredients ready. Correct rate of addition is important. Ingredients for the primary emulsion should all be weighed and measured before starting to make the product.

General method of preparation of an emulsion using the dry gum method

- The preparation of an emulsion has two main components:
  - A. Preparation of a concentrate called the primary emulsion
  - B. Dilution of the concentrate.

A. Preparation of the primary emulsion

1. Measure the oil accurately in a dry measure. Transfer the oil to a large dry porcelain mortar, allowing all the oil to drain out.
2. Measure the quantity of aqueous vehicle required for the primary emulsion. Place this within easy reach.
3. Weigh the emulsifying agent and place on the oil in the mortar. Mix lightly with the pestle, just sufficient to disperse any lumps. Caution: over-mixing generates heat, which may denature the emulsifying agent and result in a poor product.
4. Add all the required aqueous vehicle in one addition. Then mix vigorously, using the pestle with a shearing action in one direction.
5. When the product becomes white and produces a clicking sound, the primary emulsion has been formed. The product should be a thick, white cream. Increased degree of whiteness indicates a better-quality product. Oil globules or slicks should not be apparent.

B. Dilution of the primary emulsion

1. Dilute the primary emulsion drop by drop with very small volumes of the remaining aqueous vehicle. Mix carefully with the pestle in one direction.
2. Transfer emulsion to a measure, with rinsings.
3. Add other liquid ingredients if necessary and makeup to the final volume.

Emulsions – Sample Prescription 1

Liquid Paraffin Emulsion

R_x

Liquid Paraffin	20	mL
Acacia	Qs	
Double Strength Chloroform Water	50	mL
Freshly Boiled and Cooled Purified Water to	100	mL

Fait emulsion. Mitte 60 mL

Sig. II tsp hs

Comments:

- This emulsion is used as a laxative to treat constipation.
- First, it is necessary to calculate the quantity of emulsifying agent (acacia) required to produce 60 ml of the emulsion.
- As paraffin oil is mineral oil, the primary emulsion ratio is (Oil: Water: Gum) (3: 2: 1). Remember the accurate preparation of the primary emulsion is crucial for the full emulsion to be satisfactorily produced.
- **'Shake the bottle'** will need to be added to the label as the product is an emulsion and will need shaking before use to ensure an accurate dose is measured.

Emulsions – Sample Prescription 1 – Dry Method

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
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Date:	Use:
Discard Date:	Color:

Emulsions – Sample Prescription 1 – Wet Method

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
--- --- --- ---	
Date:	Use:
Discard Date:	Color:

Emulsions – Sample Prescription 2

Castor Oil Emulsion

R_x

Castor Oil	20	mL
Acacia	Qs	
Double Strength Chloroform Water	50	mL
Freshly Boiled and Cooled Purified Water to	100	mL

Fait emulsion. Mitte 100 mL

Sig. II tsp hs

Comments:

- This emulsion is used as a cathartic to evacuate the bowel.
- First, it is necessary to calculate the quantity of emulsifying agent (acacia) required to produce 100 ml of the emulsion.
- As castor oil is a fixed oil, the primary emulsion ratio is (Oil: Water: Gum) (4: 2: 1). Remember the accurate preparation of the primary emulsion is crucial for the full emulsion to be satisfactorily produced.
- **'Shake the bottle'** will need to be added to the label as the product is an emulsion and will need shaking before use to ensure an accurate dose is measured.

Emulsions – Sample Prescription 2 – Dry Method

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
---------- ---------- ---------- ----------	
Date:	Use:
Discard Date:	Color:

Emulsions – Sample Prescription 2 – Wet Method

Calculation:

Procedure:

Use:

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
--- --- --- ---	
Date:	Use:
Discard Date:	Color:

SAMPLE ANSWER SHEET

Pharmaceutics II – Practical Course - 2019 - 20

Suspensions – Sample Prescription 2

PEDIATRIC CHALK MIXTURE

Rx

		(0.0.5)
CHALK	20g	1g
TRAGACANTH	2g	0.1g (100mg)
CONC. CINNAMON WATER	4mL	0.2 mL (4 DROPS)
SYRUP	100mL	5mL
DOUBLE STRENGHT CHLOROFORM WATER	500mL	25mL
POTABLE WATER — TO	1000mL	50 mL

MAKE SUSPENSION. SEND 50mL.

SIG: TWO TEASPOONFUL TO BE GIVEN FOUR TIMES A DAY.

Calculation:

Factor = 50/1000 = 0.05.

Procedure:

1. WEIGH 100mg TRAGACANTH AND 1g CHALK ACCURATELY ON A ANALYTICAL BALANCE.
2. MEASURE 5mL SYRUP IN A GRADUATED CYLINDER.
3. THEN, MEASURE 25mL OF DOUBLE STRENGHT CHLOROFORM WATER ON A SEPARATE GRADUATED CYLINDER.

SAMPLE ANSWER SHEET

Pharmaceutics II – Practical Course - 2019 - 20

4. TRANSFER THE TRAGACANTH 100mg TO A PORCELAIN MORTAR.
5. THEN, BY USING THE GEOMETRIC MIXING TECHNIQUE, ADD CHALK 1g, AND MIX THE TWO POWDERS.
6. ADD SYRUP 5mL TO THE MORTAR AND MIX TO FORM SMOOTH PASTE.
7. THEN ADD LITTLE AMOUNT OF DOUBLE STRENGHT CHLOROFORM WATER TO MAKE IT POURABLE.
8. TRANSFER THE MORTAR CONTENTS TO GRADUATED CYLINDER.
9. RINSE THE MORTAR WITH LITTLE AMOUNT OF DOUBLE STRENGHT CHLOROFORM WATER AND ADD THE RINSING TO THE CYLINDER.
10. NOW, ADD 4 DROPS OF CINNAMON WATER TO THE CYLINDER.
11. MAKEUP THE VOLUME WITH REMAINING DOUBLE STRENGHT CHLOROFORM WATER AND POTABLE WATER.

Use:

THIS PREPARATION IS USED TO TREAT DIARRHEA IN CHILDREN.

Label:

Taibah University – College of Pharmacy Pharmaceutics and Pharmaceutical Technology Department	
PEDIATRIC CHALK MIXTURE TWO TEASPOONFULS TO BE GIVEN FOUR TIMES A DAY SHAKE THE BOTTLE BEFORE USE.	
Date: 10-04-2020	Use: INTERNAL
Discard Date: 24-04-2020	Color: WHITE

12. TRANSFER TO AN AMBER FLAT MEDICAL BOTTLE.
13. LABEL AND DISPENSE.

Evaluation Sheet

Student Name: ----------

Student Number: ----------

Working Space Number: **Group / Section:**

Sl. No	Lesson No	Date	Evaluation	Comment	Signature
Solutions					
1	Prescription 1 Simple Syrup	/ / 20			
2	Prescription 2 Cough Syrup	/ / 20			
3	Prescription 3 Belladonna mixture pediatric BP	/ / 20			
4	Prescription 4 Potassium citrate mixture BP	/ / 20			
5	Prescription 5 Rehydration Solution	/ / 20			
6	Prescription 6 Anti-rheumatic Mixture	/ / 20			
7	Prescription 7 Compound Sod. Chloride Mouth Wash	/ / 20			
8	Prescription 8 Potassium Permanganate Solution	/ / 20			
Suspensions					
9	Prescription 1 Magnesium Trisilicate Mixture	/ / 20			
10	Prescription 2 Pediatric Chalk Mixture	/ / 20			
11	Prescription 3 Clobazam Suspension	/ / 20			
Emulsions					
12	Prescription 1 Liquid Paraffin Emulsion	/ / 20			
13	Prescription 2 Castor Oil Emulsion	/ / 20			

Average Evaluation

Notes: ----------